UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/856,853	05/25/2001	Akihiko Ito	109158	4755

25944 7590 01/14/2004

OLIFF & BERRIDGE, PLC
P.O. BOX 19928
ALEXANDRIA, VA 22320

EXAMINER	
ABDULSELAM, ABBAS I	
ART UNIT	**PAPER NUMBER**
2674	12

DATE MAILED: 01/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/856,853	ITO, AKIHIKO	
	Examiner	Art Unit	
	Abbas I Abdulselam	2674	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 November 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *24-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *24-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *6* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 24-46 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 24-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scheffer et al. (USPN 5852429) in view of Konuma et al. (USPN 5818557) and Okamoto (USPN 6094184).

Regarding claims 24 and 30, Scheffer teaches LCD matrix display system (10) including pixels (26) and a frame period (T). See Fig 1. Scheffer teaches gray scale method of addressing display (12) including a pulse width modulation where several frame periods T of the display information are used to control the duration of the time that the pixel is "on" compared with the time the pixel is "off" (col. 25, 18-23 and 39-44). Scheffer, in connection to pulse width modulation, teaches the time "on" and "off" information state of a pixel with respect to each time interval delta (t) sub k being subdivided into G smaller time intervals delta (t) sub kg (col. 25, lines 45-67.) see Fig. 20. Furthermore, Scheffer teaches that electrode pattern as shown in Fig 1 comprises multiple rows and columns from which a pixel is formed at the intersection (col. 5,

lines 38-43). Scheffer further teaches mathematical equations to calculate the use voltage across the pixel. For example, Scheffer teaches averaging the pixel voltage over a frame period, calculating ratio of the magnitude of the peak voltage occurring a given state of the pixel, and illustrating the "on" and "off" states of pixel with respect to "on" and "off" RMS voltage across the pixel. See col. 6, lines 55-67 (equations 5& 6), and col. 14,lines 21-46 (equations 37 and 38).

However, Scheffer does not disclose turning "on' or "off" the pixels in the second time period in accordance with a threshold voltage of a transmissivity characteristics relative to a voltage applied to electro-optical material used in the electro-optical device. Konuma on the other hand teaches a transmissivity –voltage characteristics of liquid crystal devices whose threshold values are 0.8V and 2V for square and circular plots respectively. Konuma also discloses waveforms for driving pixels in which each pixel is maintained in an on-state or in an off-state by keeping the transmittance Tlc constant regardless of the fact that the pixel potential Vlc gradually approaches 0 due to natural discharge. See fig. 11, lines 1-8, 63-67, col. 32, lines 3-8 , Fig.11 and Fig. 14.

Therefore, it would have been obvious to one having skill in the art at the time the invention was made to modify Scheffer's liquid crystal display system to adapt Konuma's method for driving pixels (Fig.14), and trasmissivity-voltage characteristics (Fig. 11). One would have been motivated in view of the suggestion in Konuma that the method for driving pixels as shown in Fig. 14 along with the transmissivity-voltage characteristics having a threshold value as plotted in Fig. 11 equivalently provides the desired on and off status of the pixels in accordance with a threshold voltage. The use of a plot showing transmissivity-voltage characteristics helps function liquid-crystal device more effectively as taught by Konuma.

Scheffer does not teach turning on or off pixel by applying a sequence of two-level signals in accordance with a gray level of the pixel. Okamoto on the other hand teaches a signal line electrode driving circuit producing gray scale signal whose pulses are set to two levels of opposite polarity of the same absolute value. Hence, Okamoto indicates that by using gray scale signal of two levels voltage application to the pixel can be reduced. See col. 16, lines 40-55.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to modify Scheffer's display system to adapt Okamoto's driving circuit including two levels voltage application. One would have been motivated in view of the suggestion in Okamoto that the two levels voltage application to the pixel is equivalent to the desired application of a sequence of two level signals. The use of driving circuit with two levels of voltage application helps function liquid crystal display system as taught by Okamoto.

Regarding claim 25, Konuma teaches pixel voltage, Vlc and transmittance Tlc of the pixel for one pixel of interest and discloses subframes within a frame and the corresponding durations (col. 31, lines 40-56 and Fig. 11). Konuma teaches "on' and "off" status of all pixels with respect to scanning (col. 31, lines 66-67 and col. 32, line 1).

Regarding claims 26 and 31, Konuma teaches a single frame divided into five subframes including all durations the shortest being described in terms of duration, To.

Regarding claims 27-28, 32, and 34, Scheffer teaches a display matrix (12) along with column and row signal generators and a swift function generator (96), which provides sequential swift function vector to row driver, IC 98. See col. 19, lines 1-14 and Fig 12. In addition, Scheffer teaches row and column addressing signals applied to LCD matrix including "on" and "off" states of pixel with respect to a period T. See Fig 1. In addition, Scheffer discloses a gray

scale system using a technique of pulse width modulation in which the information state of a pixel is either "on" or "off". See col. 25, lines 39-48 and Fig. 20.

Regarding claims 29 and 33, Konuma teaches the use of liquid crystal optical device heated to certain temperature and then held at that temperature fro a given time and gradually cooled. See col. 12, lines 22-26.

Regarding claim 35, Scheffer teaches matrix-addressing techniques inducing no frame response such as allowing only one "off" pixel per column. See col. 2, lines 56-63.

3. Claims 36-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakai et al. (USPN 5892495) in view of Scheffer et al. (USPN 5852429) and Konuma et al. (USPN 5818557) and Okamoto (USPN 6094184).

Regarding claims 36, 38-39 and 41, Sakai teaches a matrix crystal type liquid crystal display panel (1) including multiple data lines (DL), multiple scanning lines (SL), a data line driving circuit (2), a scanning line driving circuit (3) and pixel (5) composed of a switching element (SW). Sakai teaches that the data line (DL) and the electrode of the pixel capacitor Cp, that is, a pixel electrode Ep are connected with the switching element SW. Sakai teaches that the scanning line driving circuit (3) sequentially selects the scanning lines (SL) and controls the closing and opening of the respective switching elements (SW) in the pixels (col. 9, lines 20-56 and Fig 2(a)). In addition, Sakai teaches the switching element for outputting the picture signal supplied from data lines to the pixel electrodes in accordance with the selection signal supplied to the scanning lines (col. 7, lines 65-67, col. 8, lines 1-4). Sakai teaches the scanning circuit with respect to a period of time required for sampling the picture as well as the data line driving

circuit (2) sequentially selecting the picture signals inputted during a period of a predetermined duration and supplies signals to the data lines (col. 6, lines 52-62 and col. 9, lines 54-56).

However, Sakai does not teach the scanning line with respect to a single frame time and sub-fields. Sakai also does not teach a data line-driving circuit with respect to signals "each designating turning on or off each pixel in accordance with a gray-scale level of respective pixels. Scheffer as discussed above teaches the time "on" and "off" information state of a pixel with respect to each time interval delta (t) sub k being subdivided into G smaller time intervals delta (t) sub kg (co. 25, lines 45-67 and Fig 7, Fig 20). Scheffer also teaches the use of a frame period (T) with respect to row and column signals of the LCD display (12) (col. 5, lines 12-24 and 50-53).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify Sakai's display system to include Scheffer's frame and pulse width modulation technique that is used to control the state of pixels (26). One would have been motivated in view of the suggestion in Scheffer that frame and pulse width modulation technique equivalently provides the desired frame time along with the state of pixels (on and off). The use of frame and pulse width modulations helps function LCD display panel as taught by Scheffer.

Sakai has been described above. However, Sakai does not disclose "turning on or off pixels in accordance with a threshold value of a transmissivity characteristics relative to a voltage applied". Konuma on the other hand teaches transmissivity-voltage characteristics of liquid crystal devices whose threshold values are 0.8V and 2V for square and circular plots respectively. Konuma also discloses waveforms for driving pixels in which each pixel is maintained in an on-state or in an off state by keeping the transmittance Tlc constant regardless

of the fact that the pixel potential Vlc gradually approaches 0 due to natural discharge. See Fig. 11, lines 1-8, 63-67, col. 32, lines 3-8, Fig. 11 and Fig. 14.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify Sakai's display system to adapt Konuma's method for driving pixels (Fig. 14) and transmissivity-voltage characteristics (Fig. 11). One would have been motivated in view of the suggestion in Konuma that the method for driving pixels as shown in Fig. 14 along with the transmissivity-voltage characteristics having with a threshold value as plotted in Fig. 11 equivalently provides the desired on and off status of the pixels in accordance with a threshold voltage. The use of a plot showing transmissivity-voltage characteristic helps function liquid crystal device more effectively as taught by Konuma.

Sakai does not teach turning on or off pixel by applying a sequence of two-level signals in accordance with a gray level of the pixel. Okamoto on the other hand teaches a signal line electrode driving circuit producing gray scale signal whose pulses are set to two levels of opposite polarity of the same absolute value. Hence, Okamoto indicates that by using gray scale signal of two levels voltage application to the pixel can be reduced. See col. 16, lines 40-55.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to modify Sakai's display system to adapt Okamoto's driving circuit including two levels voltage application. One would have been motivated in view of the suggestion in Okamoto that the two levels voltage application to the pixel is equivalent to the desired application of a sequence of two level signals. The use of driving circuit with two levels of voltage application helps function liquid crystal display system as taught by Okamoto.

Regarding claims 37 and 40, Sakai teaches an address signal with respect frequencies and time required for reading data corresponding to each pixel. See col. 6, lines 25-34.

Regarding claims 42-44, konuma teaches the polarity of an electric field applied to a pixel electrode being inverted and the orientation of the liquid crystal molecules being inverted by applying voltage thereby to perform switching operation from bright state to a dark state or from the dark state to a bright state. See col. 3, lines 1-16.

Regarding claims 45-46, Sakai teaches a display system where in the pixel electrodes, the elements, and the data line driving circuit are provided on either amorphous silicon thin film or monocrystalline silicon film formed on insulating substrate. See col. 8, lines 5-9.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communication from the examiner should be directed to **Abbas Abdulselam** whose telephone number is **(703) 305-8591.** The examiner can normally be reached on Monday through Friday (9:00-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Richard Hjerpe**, can be reached at **(703) 305-4709.**

Any response to this action should be mailed to:

Commissioner of patents and Trademarks

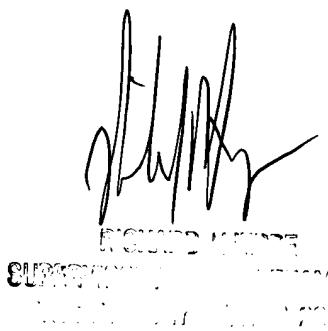
Washington, D.C. 20231

or faxed to:

(703) 872-9314

Hand delivered responses should be brought to Crystal Park II, Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology center 2600 customer Service office whose telephone number is (703) 306-0377.



Abbas Abdulselam

Examiner

Art Unit 2674

January 9, 2003